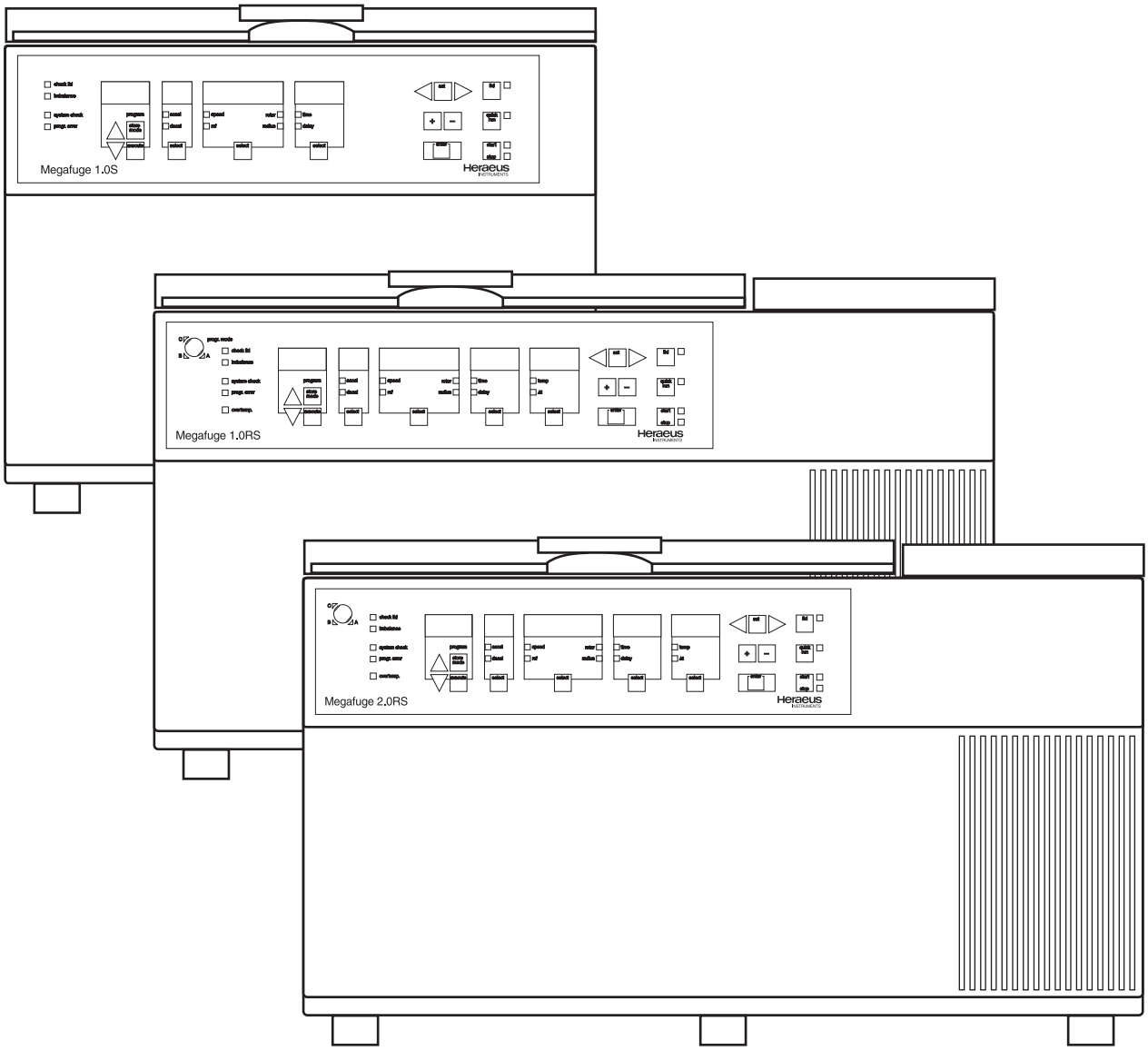
Heraeus

MEGAFUGE 1.0S
MEGAFUGE 1.0RS
MEGAFUGE 2.0RS

Operating instructions
User interface "Sepacontrol"

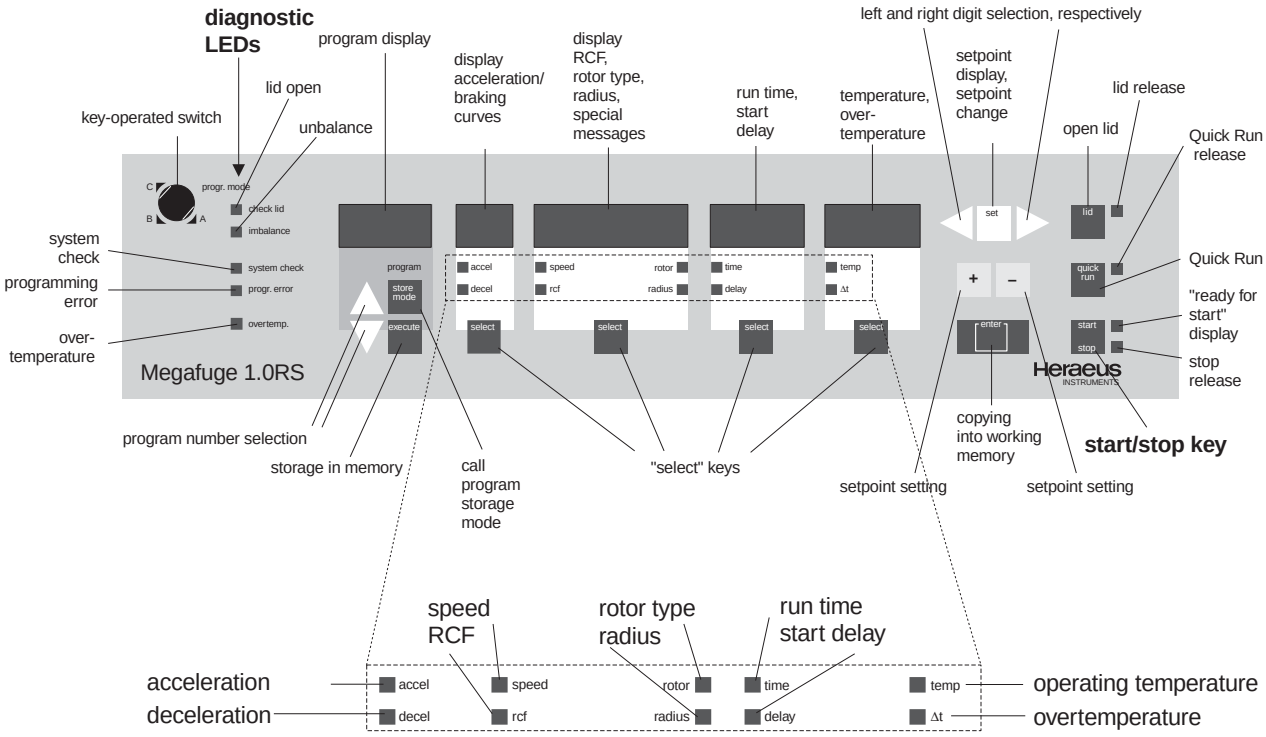


User interface "Sepacontrol"

The user interface "Sepacontrol" from Heraeus is designed for programming and using the operating functions. The present description substitutes the corresponding section of your operating instructions.

The figure below shows the user interface of the Megafuge 1.0RS, which is described in detail below. On the last page of the Appendix you will find the same figure enlarged to full-page size.

Key-operated switch



assignment LEDs

You can use the key-operated switch to set the operating mode of "Sepacontrol".

Position A:	Unlimited programming. You can call or change all programs.
Position B:	The program memory is protected against modifications. However, the current centrifugation program in the main memory can still be modified.
Position C:	Program and main memory are protected against modifications. The preset centrifugation program can be run an unlimited number of times by actuating the control keys. The setpoints can be displayed any time by pressing "set" or the select key ("select").

You can pull out the key in any position. The respective setting is then valid until the next modification.

If you are in a hurry:
Setting the centrifugation conditions without storing the parameters.

Prerequisites: The centrifuge is properly installed, the rotor correctly loaded and balanced, the key-operated switch in position A or B.

General procedure for all "select" fields:

- Press the "set" key. The display selected for the previous run flashes.
- Press the "select" key under the desired function field until the red LED next to the parameter to be changed (e.g. "temp") is lit. Choose the digit to be altered by briefly pressing one of the direction keys to the left and right of the "set" key (◁□▷) (repeatedly if necessary), and increase or decrease the count by pressing the + - or - key until the desired number is displayed.
- By **briefly** pressing the key you increase or decrease the chosen digit by one step at a time. If you press and hold the chosen key, the display changes continuously upward and downward, respectively. Release the key as soon as you have reached the desired value, and fine-tune if necessary by repeatedly pressing the key.
- Acknowledge each entry by pressing "enter".

To enter parameters:

1. Press first the "set" and then the "select" key under the four-function field ("speed", "rcf", "rotor", "radius") until the red LED next to "rotor" is lit, and enter the order number of the rotor (only possible when centrifuge is at rest).

Entering the rotor order number is mandatory. The built-in electronics uses this information to recognize the maximum permissible speed and sees to it that it is not exceeded.

2. *Optional:* Choose one of the accelerating and braking curves ("accel" and "decel", respectively, possible choices no. 1–9 for both, plus 0 for brakeless deceleration with "decel", see Appendix).

NOTE: If with the braking curve preset to 0, the set speed is lowered during the run, the newly set speed is triggered with braking curve 1; the preset curve 1 remains unchanged.

3. *Optional:* Enter the centrifugation radius. You can set the radius in steps of 10 mm and 1 mm, respectively, from the nominal radius (maximum value) to the smallest radius compatible with the design. **When preselecting an RCF value (see below), the set RCF value corresponds to the radius entered here.**
4. Set the speed, or alternatively the relative centrifugal force (RCF, in multiples of the earth gravity *g*). To do this, choose the respective parameter ("speed" or "rcf") in the four-function field ("speed", "rcf", "rotor", "radius"), and enter the desired value.
5. Set the run time. Select "time", and enter the desired run time. The time measured is the one between the start and the end of the braking process.

h.min:	Entry and display in hours and minutes, between 0.00 and 9.59
h:	Entry and display in hours, between 10 and 99
hld	Continuous operation (hld = "hold")

6. *Optional:* Enter the desired start delay (1 min to 99 hours, display: "delay").
7. **Only refrigerated centrifuges** (MEGAFUGE series RS): Set the temperature to a value between 0 °C and 40 °C.
8. *Optional* (only refrigerated centrifuges – MEGAFUGE series RS): Set the overtemperature control to the desired value (minimum 5 K, upper limit set by the built-in microprocessor). The centrifuge switches automatically off when the overtemperature is exceeded (setpoint + Δt).

NOTE: Altered parameters are accepted by the main memory only if acknowledged with "enter" (or "start"). Otherwise, following a timeout of about 2 min (or about 20 s with the centrifuge running), the instrument switches the display to the actual values without accepting the modifications.

Operation without program

1. Close the centrifuge lid if still open. The yellow LED next to the "lid" key is lit, the "ready for start" display next to the start/stop key (green LED) is activated, and the centrifuge is ready for use.
2. Press the start/stop key. The centrifuge starts according to the factory-set default value with the acceleration curve no. 9 (acceleration curves see Appendix). The "lid" LED goes out, the lid cannot be opened any more. The very moment the centrifuge starts, the stop function is released (red LED next to the start/stop key is lit).
3. Wait until the instrument stops automatically after completing the set run time (braking curve, see Appendix). However, you may stop the centrifugation any time by pressing the start/stop key. At this point the green LED is lit anew, e. g. you can continue a manually interrupted run at any time.

Turning off the continuous tone after centrifugation: any key for current run, "enter" key in actual value mode for all subsequent runs (in this case brief display "Alert off"; renewed "enter" or mains supply ON/OFF results in "Alert on").

Display

Actual values

If none of the display panels flashes, actual values are displayed; this is true both during a centrifuge run and at rest. The display values changes as soon as the instrument registers new actual values (e. g. speed during a run, temperature at rest, etc.). Following a centrifuge run, the time display reads the remaining run time (which is different from 0 only in case of premature STOP) or the run time passed (if "hld" has been preselected). This gives the operator an opportunity to check whether the run has been prematurely interrupted e. g. by a short-term power failure. The actual time display is overwritten with the new actual values only following a renewed start or power OFF/ON.

By pressing the respective "select" key you can switch between the parameters (acceleration or deceleration, speed, RCF etc.). The LED for the currently displayed parameter is lit (see figure under "assignment LEDs"). Further explanations see in the following section under "setpoint values".

Setpoint values

In order to display the current setpoint values, **always press first the "set" key** (display panels flash) and then the key listed below as required.

Program display	displays the number of the currently active program after pressing "store mode" key (01–32)
acceleration/ braking curves	displays the number of the acceleration curve (1–9), upon pressing the "select" key the number of the braking curve (0–9) (see Appendix)
speed, RCF, rotor type, radius	displays the set speed, and upon pressing the "select" key successively the relative centrifugal force (in multiples of the earth gravity *g*), the rotor type (identical to the rotor or bucket order no.) and the radius setting
run time, start delay	displays the set run time and upon pressing the "select" key the start delay (if set)
temperature, overtemperature	displays the temperature setpoint, and upon pressing the "select" key the overtemperature control (if set; lowest value 5 K)

Program settings

Entering settings for multiple runs (permanent storage in the program memory)

Prerequisites: key-operated switch in position A; centrifuge at rest.

You have the choice between the two methods described below to permanently store programs in the program memory:

A Opening the program memory <u>before</u> setting the run parameters

1. Press one of the keys △ (for increasing the value) or ▽ (for decreasing the value) in the "program" field to set the desired number (01 to 32).
2. Open the current memory location by pressing the "store mode" key. The opening is signalled by a flashing display of one of the parameter fields and of the selected program number in the program display.

NOTE: The selected memory location can only be opened if one of the parameter display panels is flashing (press one of the keys △, ▽ or "set" if necessary). Upon opening a memory location you cannot switch to another location.

3. Set the setpoints for the parameters as detailed on page 3.
4. After having completed all settings, press "execute" key. The program number display and the parameter display stop flashing, thus showing that the recent settings have been copied from the main memory into the program memory and are available for future runs under the chosen program number.

B Opening the program memory <u>after</u> setting the run parameters

1. Select the intended program memory location exactly as described under **A** 1.
2. Set the desired setpoints as detailed on page 3. As soon as you change the first parameter with the "+" or "-" key, the program number display reads "--".
3. Open the program memory selected according to **B** 1. by pressing "store mode" (cf. **A** 2.).
4. Store the program by actuating the "execute" key (cf. **A** 4.).

   NOTE: If a memory location opened with "store mode" is not closed by "execute", it is closed automatically following a timeout of 2 min. Both program memory and main memory keep their respective former values, i. e. any settings altered in the display are discarded.

Operation with program

You can run preset programs either as stored, or you may change individual settings for the current run. The stored program settings are **not** modified by changing individual settings (this is possible only via the programming routine, see above).

Prerequisites: The centrifuge is properly installed, the rotor correctly loaded and balanced, the key-operated switch in position A or B.

Program run as stored

1. Program selection: Press one of the direction keys △ or ▽ until the desired program number is displayed.
2. Press the start/stop key within 2 min. The contents of the selected program memory location is loaded into the main memory, and the program is executed immediately. You may stop the centrifugation any time by pressing the start/stop key once again.

Program run with modifications

1. Program selection: Press one of the direction keys △ or ▽ until the desired program number is displayed.
2. Press the "execute" or "enter" key, the program settings are loaded into the main memory.
3. Make the desired changes as detailed on page 3. The program display reads "--" as a reminder that the current settings do no longer correspond to those of the originally selected program. However, the original, stored program is unchanged and still available.
4. Press the start/stop key. The program run is started at once. You may stop the centrifugation any time by pressing the start/stop key once again.

"Quick-Run" operation

Independent of set values you can, with the lid closed, start a centrifuge run using the "Quick-Run" key.

ATTENTION – WARNING!

As long as the "Quick-Run" key is pressed, the rotor is accelerated with maximum force to its maximum permissible speed, i. e. the set speed is ignored.

The run is continued until the key is released, upon release the rotor is braked with maximum force. By pressing the key once again, you can switch back to acceleration.

Appendix

Diagnostic LEDs

LED	"lid" check lid	Centrifuge lid not closed.
LED	"imbalance" rotor imbalance	Rotor not evenly loaded.
LED	"system check" system check	Electronics malfunction.
LED	"program error" program error	Operating error.
LED	"overtemp." overtemperature	The set temperature limit is exceeded.

Malfunctions – measures for self-help

Malfunction		**Cause**	**Remedy**
Symptom	**Behavior**		
Set position flashes upon pressing the "set key	Setting with "+/-" keys impossible, lid cannot be opened, start and stop OK.	Position of key-operated switch prevents programming.	Turn key-operated switch from position C to A or B, if no response, call Service.
Displays remain dark	Drive stops suddenly, rotor stops without braking, lid cannot be opened.	Power failure.	Check power supply, if OK call Service.
Displays fail briefly	Drive stops suddenly, rotor stops without braking.	Short-term power failure.	Start anew.
Unusually loud running noise, possibly with display "imbalance"	Drive fails, brakes or keeps running noisily.	1. Sudden imbalance due to broken vessel and mass shift. 2. Rotor or drive damage. 3. Malfunction in the control. 4. Damaged fans or compressor.	If the centrifuge does not stop by itself, press "quick run" key Look for apparent cause at standstill and relieve if possible. Otherwise call Service.
"OPEN" message displayed	Centrifuge cannot be started; lid apparently closed.	1. Lid lock not properly engaged. 2. Lid lock defective.	Press lid forcefully down, **do not bang!** If LED does not go out, call Service.
"check lid" LED is lit and interval tone sounds	Drive is turned off and coasts brakeless to standstill.	1. Lid lock was opened manually during the run, **action not permitted!** 2. Lid lock safety circuit has tripped.	1. Press lid shut immediately, switch mains supply OFF/ON, press "start" to resume centrifugation, otherwise "stop". 2. Safety circuit malfunction, call Service.

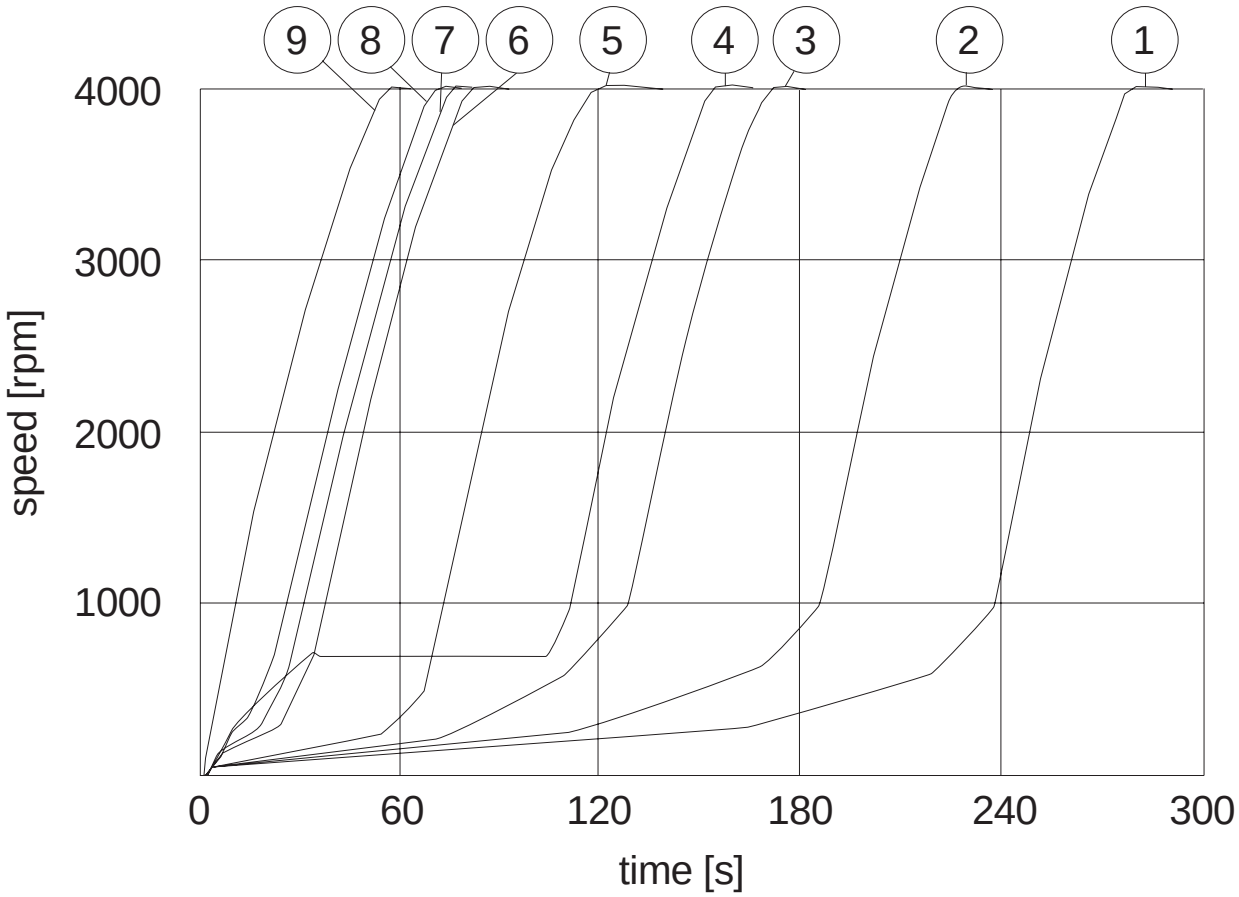
Malfunction		Cause	Remedy
Symptom	**Behavior**		
"imbalance"-LED is lit, interval tone	Centrifuge brakes maximally with braking profile 9.	1. Rotor unevenly loaded. 2. Bucket does not swing out properly or not at all. 3. Sudden vessel breakage with center of gravity shift by leaking liquid. 4. Defective drive mechanism (damaged motor shaft). 5. Mechanical or other changes on rotor or buckets. 6. Centrifuge tilted.	1. Distribute buckets, inserts and fillings evenly. 2. Clean and grease (#70006692) rotor pin and opposite surface on the bucket. 3. Remove splinters, broken parts and sample residues, clean buckets and fill anew, restart with reduced speed if necessary. 4. **Do not start drive any more!** Call Service. 5. **Discontinue use of rotor and/or buckets!** Inform Service. 6. Align centrifuge (drive), call Service if necessary.
"overtemp"-LED LED is lit, interval tone	**After starting:** Drive switched off, refrigerating unit running. **During operation:** Centrifuge stops without braking, refrigerating unit running.	Δt-alarm is activated because the rotor chamber has not been precooled to temperature setpoint. Overtemperature alarm, displayed temperature exceeds permissible threshold value: temperature of the environment (35 °C max.) or distance to wall (15 cm). 1. Δt dependent: cooling capacity of refrigerating unit insufficient 2. No Δt programmed: defective refrigerating unit	Open lid, turn off Δt ("--"), close lid and start; wait until cooled to desired setpoint temperature range, then activate Δt. Wait until centrifuge has cooled, possibly remove and cool samples after standstill, precool centrifuge and run again if necessary, do not operate near heat generators. Repeat run with reduced speed, if deviations are considerable call Service. Call Service.
"E-17" display, "system check"-LED is lit, interval tone	Upon pressing "lid" key at standstill	1. Lid lock mechanism jammed, does not open 2. Lid lock defective	Mains supply OFF, check lid lock mechanism and correct if necessary. Call Service.
"system check"-LED is lit, interval tone "E-xx" display flashes in the speed panel, other possible xx numbers 00-24	**During operation:** Drive coasts brakeless to standstill. **At standstill:** Drive switched off after start.	Tripping of a thermal or electrical protection function, e. g. E-08. Malfunctions in data transmission or measuring.	Switch off centrifuge and resume operation after a minimum of 15 min, if error occurs repeatedly call Service. Mains supply OFF/ON, if error persistent call Service.

Technical data of "Sepacontrol"

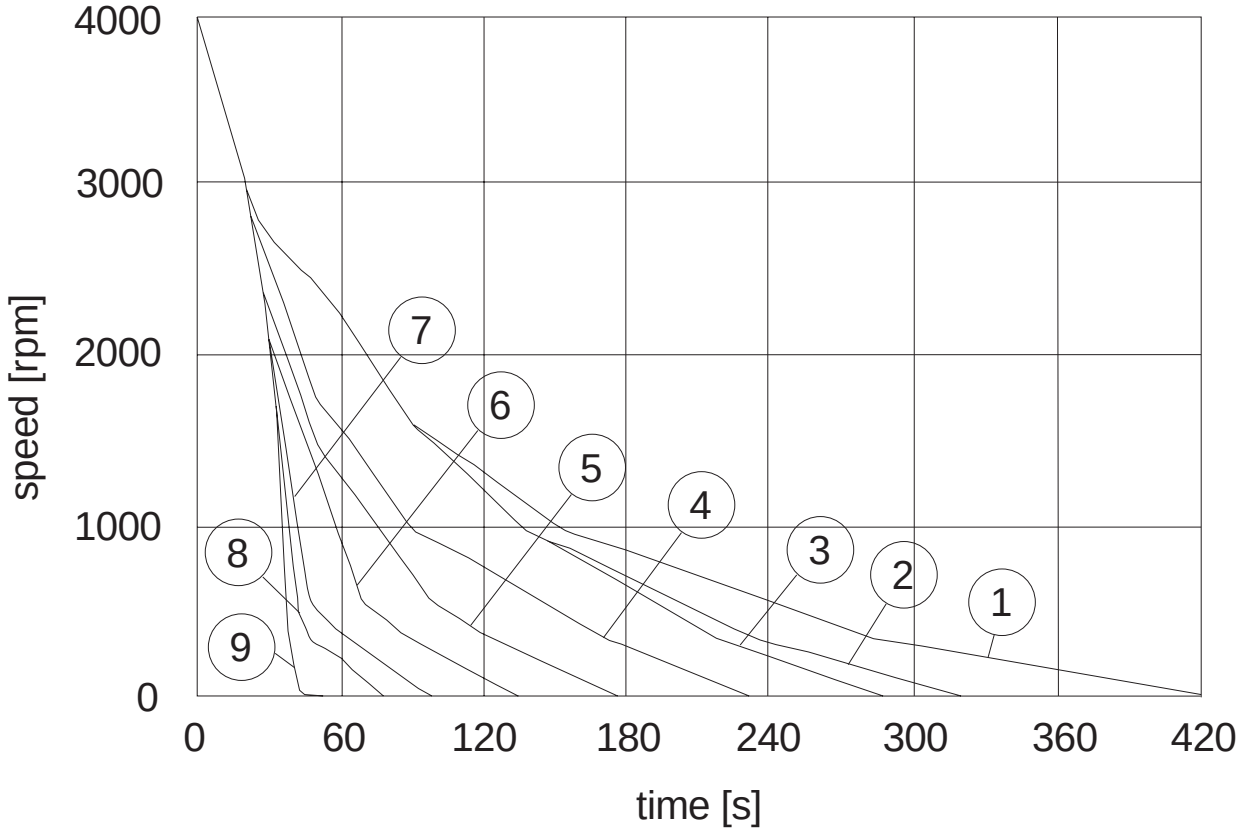
Feature	Possible settings
Program memory	for 32 complete sets of parameters
Program backup	unauthorized intervention in stored programs lockable via a three-step key-operated switch
Data storage	almost unlimited with NV-RAMs
Diagnostic messages	via LEDs for • lid not closed during operation • unbalanced loading • general malfunction of the instrument • data transmission error • overtemperature
Digital parameter display	for program number, acceleration and braking profiles, speed, RCF, rotor, radius, time, start delay, temperature and overtemperature
Acceleration curves	1–9 profiles selectable
Braking curves	1–9 profiles and 0 = coasting to standstill
Speed selection	continuously between 100 min^{-1} and maximum speed in steps of 1000, 100 and 10 min^{-1}
RCF selection	continuously between 1 x g and maximum RCF value in steps of 1000, 100, 10 and 1 x *g*
Rotor selection	integral numbers, organized according to order numbers in ascending order
Radius selection	dependent on rotor in 0.1-cm steps
Time selection in 3 modes:	
hld	continuous operation
h.min	1 min – 9 h 59 min
h	10 h – 99 h
Start delay in 3 modes:	
--	immediate start (no delay)
h.min	1 min – 9 h 59 min
h	10 h – 99 h
Time display with "Quick Run":	
min. sec mode	1 s – 9 min 59 s
t mode	10 h – 99 h
Temperature selection	0 °C – 40 °C in steps of 10 K and 1 K
Overtemperature control Δt:	
--	no overtemperature control
5 K $\leq \Delta t \leq$ (40 °C – $T_{setpoint}$)	if 0 °C $\leq T_{setpoint} \leq$ 30 °C
5 K $\leq \Delta t \leq$ 10 K adjustable in 1 K steps	if 31 °C $\leq T_{setpoint} \leq$ 40 °C

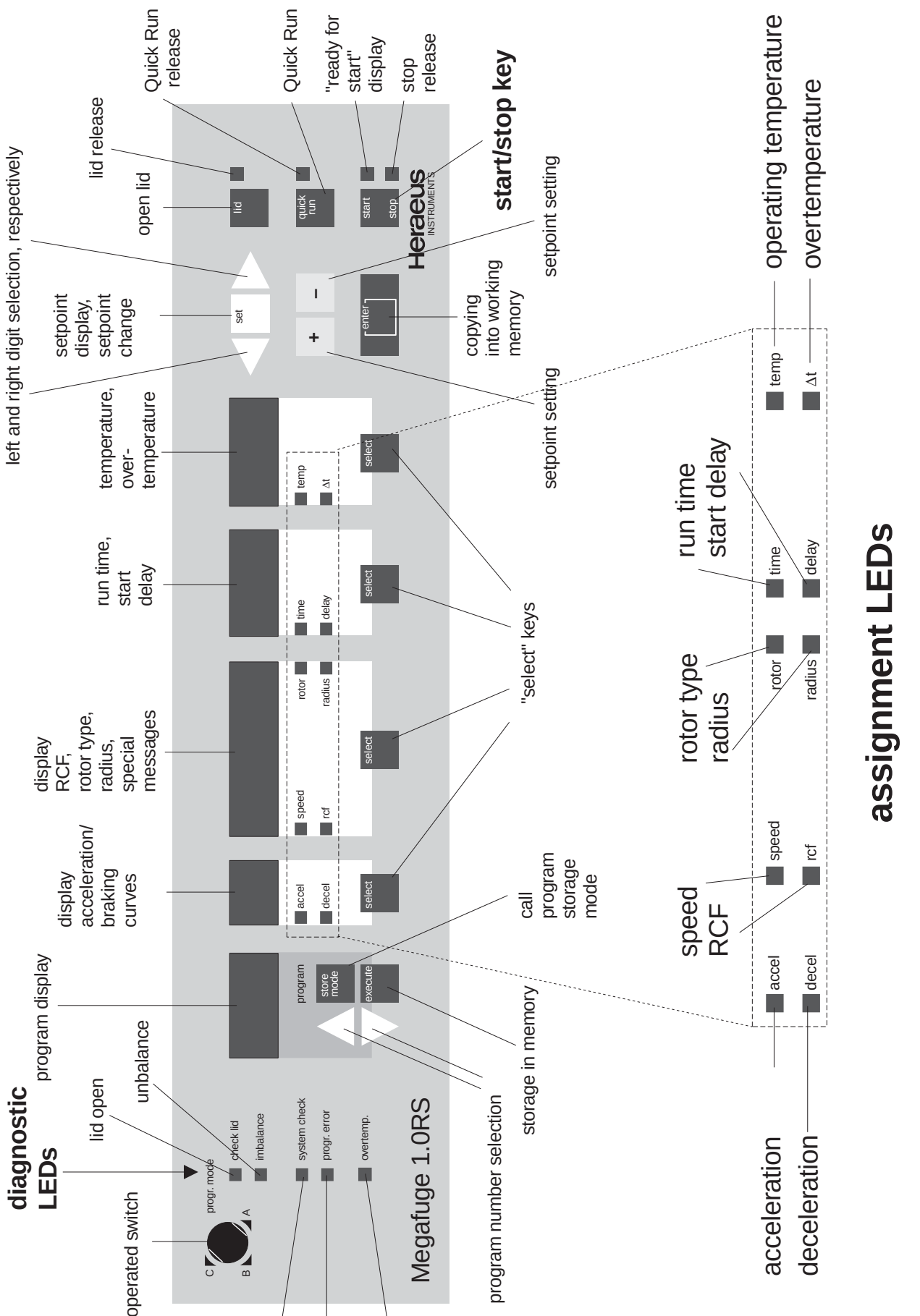
Acceleration and braking curves

Acceleration curves



Braking curves

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Kendro Laboratory Products

Kendro Laboratory Products GmbH
Postbox 15 63
D-63405 Hanau / Germany
Telephone:
(+49) 61 81/ 35-300

Telefax:
(+49) 61 81/ 3 57 49, Sales
(+49) 55 22/ 31 62 76, Service
Telephone:
(+49) 55 22/ 31 62 22, Service

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